

## DEVELOPMENT OF A THERMAL ELECTRICALLY CHILLED GRIPPING FIXTURE FOR TENSILE AND FATIGUE TESTING OF SOFT TISSUE

Nickel T, Anderson S\*, Bruckner B, Eriksen C, Grimes K, Lawrence A, Shukla J, Stinson J, Strei D, Durfee W\*\*

\*EnduraTEC, 5610 Rowland Road, Minnetonka, Minnesota

\*\*University of Minnesota, Dept. of Mechanical Engineering, Minneapolis, Minnesota

### ABSTRACT:

Mechanical testing and characterization of soft tissue such as tendons and ligaments require a consistent means to grasp the tissue without crushing or tearing it. Traditional methods to grasp this tissue have often counted on using the bone chip that the tissue is connected to be potted in bone cement and grasped in conventional material testing fixtures. Unfortunately the researcher does not always have the luxury of using the bone chip and has to find other means to grasp the tissue.

Literature has described several tests performed using a “cryo-grip”, a modified version of a conventional material testing clamping fixture that is chilled using machined dry ice or plumbed for liquid nitrogen in order to freeze the soft tissue specimen between the faces. The problem has been that the cryogenic materials necessary for this option are costly, difficult to handle, and often freeze the soft tissue well beyond the grip faces and into the test gage length.

In collaboration between the University of Minnesota and private industry, a novel solution was devised using Peltier technology as the primary chilling device. A set of fixtures was developed for tension, tension-tension fatigue testing of tendons and ligaments.

